



Fermi National Accelerator Laboratory

FERMILAB-Conf-98/100-E

CDF

Measurement of Time-Dependent $B^0 - \bar{B}^0$ Flavor Oscillation at CDF

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April 1998

Published Proceedings of the *International Europhysics Conference on High Energy Physics*, Jerusalem, Israel, August 19-26, 1997

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**Measurement of Time-Dependent $B^0 - \bar{B}^0$
Flavor Oscillation at CDF.**¹

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Abstract

The time dependence of $B^0 - \bar{B}^0$ oscillations has been studied using several techniques by the CDF experiment at Fermilab. The data comprise 110 pb^{-1} of $p\bar{p}$ collisions at $\sqrt{s} = 1.8 TeV$. Preliminary measurements of the $B^0 - \bar{B}^0$ oscillation frequency (Δm_d) will be presented.

¹ Talk presented at the EPS 97 conference, held on 19-26 August 1997 in Jerusalem.

911: Measurement of Time-Dependent $B^0 - \overline{B}^0$ Flavor Oscillation at CDF.

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Large samples of B hadron decays are selected using the following triggers:

1. inclusive single lepton (e, μ). The transverse momentum threshold is about $8 \text{ GeV}/c$.
2. dilepton ($e\mu; \mu\mu$). The transverse momentum threshold is $2 \text{ GeV}/c$ for the dimuon trigger; for the other trigger it is $5 \text{ GeV}/c$ for the electron and $2.5 \text{ GeV}/c$ for the muon.

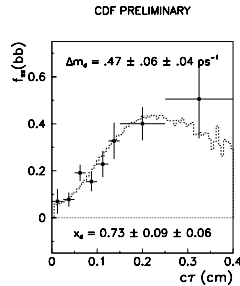
Four analyses are presented here for the $B^0 - \overline{B}^0$ mixing; two of them use the single lepton triggers, and the other two use dilepton triggers.

Jet Charge inclusive lepton analysis : the sign of the trigger lepton tags the flavor of the B at decay time; the flavor at production is obtained either from the sign of the other lepton, if another lepton is found, or from the the sign of jet charge:

$$Q_{jet} = \frac{\sum_i q_i (\mathbf{p}_i \cdot \mathbf{a})}{\sum_i (\mathbf{p}_i \cdot \mathbf{a})}$$

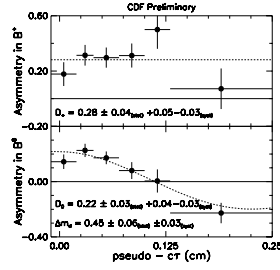
where \mathbf{a} is the jet axis, and the sum is over the tracks in the jet.

The result obtained is: $\Delta m = 0.47 \pm 0.06 \text{ (stat)} \pm 0.04 \text{ (syst)} \text{ ps}^{-1}$.

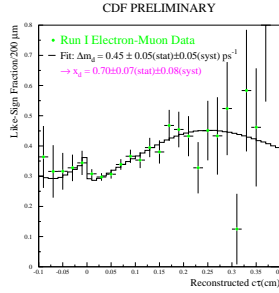


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l + D^(*) with Same Side Tagging : the lepton trigger tags the flavor of the B at decay time; the flavor at production is obtained from the sign of the track, selected on the same side, which has the minimum transverse momentum with respect to the l^-D^* system, and is within a 0.7 cone in $\eta-\phi$. In fact, \overline{B}_d^0 (B_d^0) mesons are expected to be produced in association with π^- (π^+), as also would happen if they were produced from B^{**} resonances. Several channels are used to reconstruct D^* 's. The result obtained is: $\Delta m = 0.45 \pm 0.06$ (stat) ± 0.03 (syst) ps^{-1} .



e - μ analysis : the sign of the lepton on the side where the secondary vertex is found tags the flavor of the B at decay. The sign of the other lepton is used to tag the flavor at production. The result obtained is: $\Delta m = 0.45 \pm 0.05$ (stat) ± 0.05 (syst) ps^{-1} .



l vs l + D^(*) : the flavor tag of the B is the same as in the $e - \mu$ analysis, but in this case the $D^{*\pm}$ is fully reconstructed, through several channels. The result obtained is $\Delta m = 0.51 \pm 0.10$ (stat) ± 0.04 (syst) ps^{-1} .

The CDF average value, obtained by combining the above four results, is $\Delta m = 0.464 \pm 0.030$ (stat) ± 0.026 (syst) ps^{-1} .